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No Deep Pockets: Some stylized results on firms' financial constraints

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No Deep Pockets: Some stylized results on firms' financial constraints

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Abstract

This paper is a brief survey of recent empirical work on financial constraints faced by firms. It is organized as a series of stylized results which mirror what is generally understood about severity of financial constraints and effects that they have upon firms. This survey shows that (a) the financial constraint is a widespread key concern for firms, hindering their ability to carry out their optimal investment and growth trajectories and (b) the severity of such constraints depends on institutional and firm specific characteristics, as well as on the nature of investment projects.

Keywords: Firms' financial constraints; Firm-level studies of firms growth.

JEL Classification: G3; L00; L2.

1. Introduction

What do we know about financial constraints? Theory is old and vast but only recently it did experience a widespread of empirical studies on firms' financial constraints. Modigliani-Miller theorem tells us that external finance is a perfect substitute for internal finance, thus financial structure of firms and financial policy is irrelevant for its investment decisions. However, this will require the strong assumption of perfect capital markets which does not hold with reality – firms face difficulties when deciding to borrow (debt or equity). The existence of capital market imperfections due to information problems is well documented (see Stiglitz and Weiss, 1981 or Myers and Majluf, 1984). The rationale is based on the existence of credit risk and information asymmetries (moral hazard and adverse selection problems) that either set the price of money on above-optimal levels or rationalize the credit. This inefficiency will set a wedge between internal and external forms of firm finance – a financing hierarchy. As a result, firms will not be able to raise the necessary amounts to fulfil their investment and growth goals. The severity of constraints and their impact will depend on firms' and institutional characteristics as well as the type of investment.

Although the existing theoretical literature on the effect of financing constraints on firms' performance is far extensive, empirical contributions seem to be rather scarce and recent. Nonetheless, the aim of this paper is to review the existing empirical literature on financial constraints, focusing on recent contributions. We shall make a brief incursion though on central theoretical results when needed.

The framework chosen to tackle this task has been to pinpoint and discuss stylized results that have gathered consensus among researchers. However, before we address these stylized results, a discussion must take place how to measure the presence of firm's financial constraints. The paper will be organized as follows. Section 2 will prepare the ground for empirical evidence by providing a discussion over investment-cash flow sensitivities as a measure of financial constraints. Section 3 presents ten stylized results, while Section 4 raises

some practical concerns that researchers in the field might find. Section 5 will pull the pieces together and concludes.

2. Investment-Cash Flow Sensitivity as a measure of financial constraints: An ongoing debate

Is Investment-Cash Flow Sensitivity (hereafter ICFS) higher for financial constrained or unconstrained firms? This is the same as asking whether or not is high ICFS a good measure of the presence of firm's financing constraints. Fazzari et al. (1988), investigate the impact of cash-flow sensitivities on investment by classifying firms according to their dividend policy.¹ The reason for this classification lies on the argument that "firms might pay low dividends [because] they require investment finance that exceeds their internal cash flow and retain all of the low-cost internal funds they can generate". Using a pooled regression of investment/capital stock on the cash-flow/capital stock ratio, estimated Q (controls for investment opportunities)² and dummies for each firm and year, upon a sample consisting of 422 USA firms (1970-1984), they found that the coefficient of cash-flow for the low-dividend group is higher and statistically different than the coefficient for the high-dividend group. This suggests that low-dividend firms invest more of their extra cash-flow than high-dividend firms. Building on this study, a large body of literature investigates the presence and the impact of financing constraints through ICFS. Carpenter et al. (1998), who compare three measures of financial constraints (cash-flow sensitivity, cash stocks and coverage ratio), find evidence confirming cash-flow as the preferred variable to test for the presence of financing constraints. Chapman et al. (1996) also find, for Australian firms, that investment is less sensitive to cash-flow when firms are financially

¹ Firms that pay low dividends are classified as financially constrained, while high-dividend firms are classified as unconstrained.

² Q measures the increase in the present value of a firm's profits resulting from a unit increase in the firm's capital stock and, as a result, Q is the market value of a unit of capital. A firm invests until the cost of acquiring capital equals the value of capital. A high level of Q thus indicates the presence of an investment opportunity. It is argued that Q summarizes all future information that is relevant for a firm when deciding to invest.

unconstrained, while Bo et al. (2003), for a sample of Dutch listed firms, find that riskier firms face more severe financial constraints and argue that ICFS is a good proxy for financial constraints if “firms are classified by the degree of uncertainty they face and if the uncertainty originates from cost uncertainty”.³ In an interesting perspective, Almeida et al. (2004) propose the “propensity of firms to save cash out of cash-flows” (cash-flow sensitivity of cash) as a proxy for liquidity constraints, because only constrained firms will manage liquidity to maximise their value. They test if financially constrained firms exhibit high cash-flow sensitivities, while unconstrained firms do not. Results for 4/5 classification schemes for constrained/unconstrained firms confirm their hypothesis. Only for the classification based on Kaplan and Zingales (1997), do the results differ.⁴

On the other hand, Kaplan and Zingales (1997) argue that cash-flow is not a good measure of the existence of financing constraints and Fazzari, Hubbard and Petersen’s a priori classification of firms is flawed. They instead classify firms according to information obtained from company annual reports and find evidence that constrained firms are the less sensitive to cash-flow.⁵ This argument is also supported by Kadapakkam et al. (1998) and Cleary (1999). Almeida and Campello (2001) draw similar conclusions. Recently, Dasgupta and Sengupta (2007), for Japan, find that the response of investment to cash-flow shocks is non-monotonic, supporting Kaplan and Zingales (1997) and Cleary (1999). However, Allayannis and Mozumdar (2002) present an explanation for Cleary (1999) and Kaplan and Zingales (1997) argument that investment is more sensitive to cash-flow for less constrained firms – influential observations for Kaplan and Zingales and negative cash-flow observations for Cleary.

Recent literature has found the Investment-Cash Flow relationship to be U-shaped, further adding to the controversy about the interpretation of cash flow sensitivities. Examples of

³ Chapman et al. (1996) classify firms as financially unconstrained when a firm’s net acquisition of financial assets exceeds its net incurrence of equity and debt liabilities.

⁴ The classification schemes based on: payout ratio, asset size, bond rating, commercial paper rating, and Kaplan and Zingales index.

⁵ Kaplan and Zingales re-examine the low-dividend Fazzari, Hubbard and Petersen firms and categorize the firms as unconstrained, possibly constrained and constrained.

these findings are Povel and Raith (2002), Cleary et al. (2007), Lyandres (2007), within a dynamic framework, and Guarilia (2008) for the UK (1993-2003 period, with 99% firms not traded) finds this relationship to hold for a wide range of industrial sectors.⁶

Finally, another group of literature points that cash-flows might contain information about firm's investment opportunities, meaning that Q should be corrected (e.g. Chirinko, 1997; Erickson and Whited, 2000; Gomes, 2001; Alt, 2003; Cummings et al., 2006; and Abel and Eberly, 2004).⁷ Nonetheless, Alt (2003) finds that even after Q correction, every firms present sensitivity to cash-flow. In addition, Bhagat et al. (2005) find evidence that financially distressed firms exhibit positive investment-cash flow sensitivities if they operate at a profit, low sensitivity if operate at a loss and invest less than in the previous year and strong negative sensitivity if operate at a loss and invest more than in the previous year, while Chang et al. (2007) find supportive evidence for the case of Australia.

Overall, since Fazzari et al. (1988) and Kaplan and Zingales (1997) the debate over the consistency of ICFS in measuring the degree of financial constraints has been intense and is still open for discussion. Not only it led to a debate between the original authors (see Fazzari et al., 2000, and Kaplan and Zingales, 2000), but it also raised a number of both theoretical and empirical issues related to the topic. Actually, however, the best what one can do is to classify firms as being constrained/unconstrained and analyse the severity of such constraints by using proxies. In particular, and despite not being a truly consistent measure, the ICFS technique seems to help clarifying the level of constraints faced by firms.

⁶ Agriculture, forestry and mining, manufacturing, construction, retail and wholesale, hotels and restaurants and business and other services; excludes regulated and financial sectors.

⁷ In particular for small firms, cash-flows reveal them the direction to go in presence of growth prospects uncertainty. Bond et al. (1999) point that ICFS might also indicate other sources of misspecification.

3. Stylized results

We were able to pinpoint ten main results that reflect the topics that suffered major contribution during recent years.

Stylized result 1. Financial constraints are more severe for younger and smaller firms.

The problems with asymmetric information in capital markets are more severe for small and young firms. This will happen either because there is still not much information on these firms available to most potential lenders, or because of “weight” and visibility of such firms. Potential lenders are not able to observe the “quality” of the risk or do not have control over the firm’s investment. Under these conditions, smaller and younger firms are expected to be more credit rationed, as shown by Jaffe and Russell (1976) and Petersen and Rajan (1994, 1995).

In fact, Hyytinen and Vaananen (2006) find evidence that Finnish SMEs face severe adverse selection and moral hazard problems and that the former is empirically more prevalent than the latter. These problems, particularly the former, are found to restrict firms’ ability to raise external funds needed to take advantage of investment opportunities. Although Kadapakkam et al. (1998) and Clearly (1999), for developed countries, find the opposite relationship (i.e. cash flow-investment sensitivity is highest in the large firm size group and smallest in the small firm size group), this result can possibly arise because “larger firms have greater flexibility in timing their investments and have more managerial agency problems” (Kadapakkam et al., 1998). Pratap (2003) advances the hypothesis that adjustment costs explain possible insensitivity of small firms’ investment-cash flow, as firms do not take major investments before they attain a threshold level of liquidity.

Egeln et al. (1997), classifying firms into financially constrained and unconstrained, find evidence for Germany (1989-94) supporting greater constraints for smaller and younger firms.⁸ In addition, using a panel of small USA firms for the period 1980-92, Carpenter and

⁸ Two classification schemes are used by the authors: self-evaluation and CREDITREFORM (largest credit agency by the time)

Petersen (2002) find that the typical firm retains all of its income and raises relatively little external finance and that, for firms that rely mostly on internal finance (90% of their sample), the impact of cash-flow on growth is greater than the unity, meaning that the growth of most small firms is constrained by internal finance. Even if for constrained firms cash-flow is independent of size, then growth will be independent of size, but the variance of growth rates will decline with size as larger firms appear to be less constrained to internal finance. Further supporting evidence is found in Oliveira and Fortunato (2006) who, using an unbalanced panel of Portuguese manufacturing firms (1990-2001), also find that smaller firms' growth is more sensitive to cash-flow implying the existence of financing constraints for such firms. Additionally, this finding also applies for younger firms. As to the overall sample, this sensitivity continues to be significant but lower.⁹

Although Audretsch and Elston (2002), for the German case from 1970 to 1986, find that the firms which report higher ICFS are medium sized, they argue that SMEs in Germany appear to benefit from a bank-oriented financial system and an institutional set that prevents smaller firms to face greater liquidity constraints.¹⁰ Their study also confirms that very large firms do not appear to be liquidity constrained. In the case of Italian manufacturing firms (1989-97), Becchetti and Trovato (2002) find that while for small firms (<50 employees) the access to external finance is a key limiting determinant of growth, for larger firms (>100 employees) the financial factor appears to be neutral. Bhaduri (2008) also reaches the same conclusions for the Indian manufacturing case. Finally, Budina et al. (2000) find evidence suggesting that firms in Bulgaria (over the period 1993-95) are financially constrained and in particular for smaller firms the constraints are more severe, while Honjo and Harada (2006) for a sample of Japanese

⁹ Small firms are defined as those with less than 50 employees and young firms defined as with less than 10 years.

¹⁰ Note that the authors divide firms into 4 classes according to their size (<500 employees; 500-1300 employees; 1300-5500 employees; >5500 employees) and thus the first class might be seen as small and medium enterprises (SMEs). Higher and most significant sensitivities are found for classes 2 and 3.

manufacturing firms during the period 1995-99, find higher growth cash flow sensitivity for younger SMEs, confirming Ogawa et al. (1996) earlier findings.

Stylized Result 2- Size distribution of firms is skewed due to financial constraints.

A set of studies concerning the evolution of firm size distribution focus on the idea that, contrary to the theorized by Gibrat's Law, growth rates and growth volatility are negatively associated with firm size (and age). One of the explanations lies on the financial constraints argument – one should expect that the presence of financing constraints leads to a skewed distribution of firm size. Cooley and Quadrini (2001), exploring financial market frictions as in Albuquerque and Hopenhayn (1997), find that smaller firms face higher probability of default, take on more debt, issue more shares and pay fewer dividends, and have higher growth rates and volatility. So, they argue, imperfect markets will lead to a skewed size distribution of firms.

Using another framework, Cabral and Mata (2003) develop a model of heterogeneous constraints at the entrepreneur level and analyse the evolution of the distribution of firm size.¹¹ Their findings suggest that age has a significant influence upon the size distribution and, in particular, the younger firms/entrepreneurs are, the greater is the skewness of the distribution explained by the financial constraints.¹² Faggiolo and Luzzi (2006) reach the same conclusions using a sample of Italian manufacturing firms during the period 1995-2000. Other studies such as Desai et al. (2003), for European economies in 1998, and Lotti and Santarelli (2004), for Italian manufacturing firms born in 1987 (followed until 1992), also support these results.

Stylized Result 3- Start-ups/new entrepreneurs appear to be financially constrained.

The founders of new firms, as being unable to raise the desired capital through their own wealth, have to apply for external finance. In order to finance such projects, banks, due to

¹¹ Note that they only allow for 2 periods and use entrepreneur's age as proxy for financial capacity. They argue that younger firms/entrepreneurs have higher probability of being financially constrained

¹² Their empirical results are obtained using a sample of Portuguese manufacturing firms in 1984 and 1991

information asymmetry problems, require collateral as well as minimum equity-debt ratio levels that in their turn are difficult to be achieved by founders. This credit rationing eventually hinders the creation of such firms, possibly firms whose expected returns on investment are higher than interest rates charged on remaining capital required. For example, Heino (2006) finds that, in the Mexican case, there is evidence that start-ups are financially constrained, as there is a strong positive relationship between probability of entering the market and entrepreneurs using their own personal savings to finance the initial investment. Meanwhile, Blumberg and Letterie (2008), through an entrepreneur perspective in an application to the Dutch reality, find that there are a set of characteristics that banks take into account when providing credit to start-ups. In particular, personal wealth, home ownership, use of own capital in the initial investment and earning capacity, all reduce the probability of a bank credit being denied. They also point out that banks tend to prefer commitments and signals when deciding to lend and that decisions to apply, even with potentially very profitable projects, might not occur due to the fact that entrepreneurs might know in advance that their project will be denied, according to the characteristics that banks value most (financial aspects). In another perspective, Bohacek (2006) finds that business families have high levels of savings that are explained by the incentive to overcome the financing constraint that prevents them from operating their firms at the optimal size. In recent papers, Magri (2008) and Nykvist (2008) find a positive relationship between personal wealth and entrepreneurship, respectively, in Italy and Sweden.

There is a body of empirical literature that points in the opposite direction. However, such conclusions might be flawed due to correlations between personal wealth and human capital. If human capital is shown to be highly correlated with personal wealth, then including both variables in the model might lead to the loss of explanatory power of one of them. This is what happened, for example, with Cressy (1996) and Kim et al. (2006), respectively for the UK and the USA cases. Grilo and Irigoyen (2006) also find that the perception of the lack of financial support has no power to explain latent entrepreneurship. Van Gelderen et al. (2006) find that one of the factors that affect negatively start-up success in Netherlands (1998-2001) is

intended start-up capital. The interpretation in this case flows from the fact that it is easier to raise smaller amounts to start a business, whilst potential successful entrants who require larger amounts of initial capital and have to resort to external financing, end up compromising their success.

Finally, van Auken, (1999) and Aghion et al. (2007) find financing constraints to work as a barrier to entry, even after controlling for other entry barriers. The reasoning is that capital requirements deter entry of new firms that have limited access to funds, in particular small firms.

Stylized Result 4- Financial constraints are determinant for firm survival.

The financial constraints faced by firms can obviously have important effects on the firm's ability to stay in the market. For example, Musso and Schiavo (2008) find that, for French manufacturing firms over the period 1996-2004, the greater the financial constraints firms face, the higher the probability that they do not survive and then exit the market. With respect to the probability of default, using a sample of Italian firms during 1996-2003, Bottazzi et al. (2007), find that the lower it is the credit rating of a firm, the higher is the likelihood of defaulting. Also analysing default probabilities, Cowling and Mitchell (2003), for the UK (1984-98), find that default is related to the cost of capital, with higher severity for smaller firms.

It is also widely accepted that the survival rate of entrants is low, which can be at least partially caused by financial constraints. Fotopoulos and Louri (2000) find evidence for Greek manufacturing firms established in 1982-84 that initial financial capital and the ratio of fixed to total assets significantly lowers the probability of a firm dying, while leverage increases the probability of death. For the Portuguese case (in the period 1985-98), in turn, Farinha (2005) finds that the probability of survival is lower for new firms that face financial constraints, have smaller initial capital, are more leveraged and have a higher number of credit relationships (as opposite to a stable relationship). She also points that the effects of financing constraints appear

to be persistent in time. Petrunia (2007) draw similar conclusions for the Canadian case (firms birth between 1985 and 1995).

Finally, financial constraints also have a negative indirect impact on firm survival. In fact, start-up size is generally accepted to have a positive impact on survival (smaller entrants face higher probabilities of failure; see for example Audretsch and Mahmood, 1995, for the USA, and Mata and Portugal, 1994, for Portugal) and one of the main determinants of start-up size is external financing (see Colombo and Grilli, 2005, for the Italian case and Eisfeldt and Rampini, 2007, for the USA case).

Stylized Result 5- R&D investment appears to be more financially constrained.

The existence of financing constraints appears to be particularly severe for firms that decide to invest in R&D because of the risks associated with the investment. As argued before, credit markets will no longer be efficient, generating a wedge between internal and external financing faced by firms as well as a financing hierarchy. This problem is usually associated with Akerlof's (1970) adverse selection in the "market for lemons" (see also Leland and Pyle, 1977, and Myers and Majluf, 1984, for information asymmetries in R&D financing). For example, Hall (1992), Hao and Jaffe (1993) and Himmelberg and Petersen (1994), for the USA firms, find support for the hypothesis that R&D investment is financially constrained in particular for small firms. Hall et al. (1999) in a comparative study of French, Japanese and the USA firms also sustain these findings, while Kukuk and Stadler (2001) find that financial constraints adversely affect the timing of innovations for German services firms. Czarnitzki (2006) also finds that, in the West Germany case, SMEs' R&D investment is financially constrained. Mohnen et al. (2008) for Dutch firms in the period 2000-02 and Savignac (2009) for French firms in the period 1997-99 find that financial constraints significantly reduce the likelihood of firms having innovative activities. In the Italian case, both Scellato (2007) and Colombo and

Grilli (2007) find that most new technology-based firms finance their initial activities through founder's wealth.

When compared with physical capital, R&D appears to be more financially constrained. As pointed by Hall (1992), due to the risky nature of R&D, firms prefer to finance their projects with internally generated funds. Using the same unbalanced panel of the USA firms (1959-1991), Chiao (2002) tests this hypothesis dividing firms into two classes: science based and non-science based. He finds that, in fact, while there is a positive relationship of current debt and current physical capital investment, the relationship between current debt and current R&D depends on the type of industry where the firm is operating. In particular, for science based industries, current R&D has a negative relationship with debt. Bougheas et al. (2003) also find evidence of financing constraints in R&D investment in Ireland, while they do not find evidence of constraints for investment in physical capital.

Stylized Result 6- Government policy to alleviate financial constraints seems to work.

Despite the inefficiencies that public intervention might cause, subsidies through tax credits or grants and credit guarantees have proved to reduce substantially the severity of financial constraints faced by firms. Becchetti and Trovato (2002), for Italian SMEs, for example, find evidence that supports a positive impact of subsidies on alleviating firms' financial constraints, while Li (2002) reaches the same conclusions analysing the USA Government credit subsidies to poor and capable entrepreneurs. Honjo and Harada (2006), for Japanese manufacturing firms during the period 1995-1999, also observe that public programs to foster SMEs have a high and positive impact in their growth. Following Hall's (2002) suggestion that public incentives to R&D might have an alleviating effect on constraints, Czarnitzki (2006) investigates SMEs in Germany (1994, 1995 and 1998) and finds that, while in West Germany SMEs' R&D investment is financially constrained, in East Germany where public subsidies seems to be the driving force behind R&D investment, firms appear not to suffer from external finance

constraints. In the case of the USA and Canadian firms, Klassen et al. (2004) observe that tax incentives to foster R&D have a positive impact in the R&D spending.

With respect to credit guarantees, Cowling and Mitchell (2003), analysing the impact of backed debt contracts on default probabilities for the UK firms, find that the policy undertaken by the Government was successful in alleviating a very real capital constraint for the majority of small business, while Kang and Heshmati (2008) observe that a Korean public policy providing credit guarantee to SMEs had significant impact on survival of the latter. Guaranteed firms had clear higher survival rates and better performance. Zecchini and Ventura (2009) also find that that Italy's credit guarantees on credit to SMEs has reached to reduce their borrowing cost and easing their financing constraints.

Stylized Result 7- Close bank relationships alleviate financial constraints.

Close bank relationships facilitate the contact between firms and banks, reducing the information asymmetries, which means lower financing constraints for firms with close but few relationships (in particular if such relationships are stable). As Diamond (1991) argues, the risk associated with any particular loan is not neutral with respect to the duration of the relationship. As a result, one can expect differences in financial constraints between market-oriented economies (such as the USA and the UK) and bank-oriented ones (Germany for example). In fact, Fohlin (1998), in an historic perspective (1903-1911), finds that Germany's close bank relationships had a significant impact in reducing financing constraints.

Bond et al. (2003) analyse ICFS of firms in Belgium, France, Germany and the UK and they find that, while for Belgian firms there is no evidence of firms facing financial constraints, there is strong evidence suggesting that firms in the UK face severe financial constraints.¹³ For the French and German case, there still exist significant financial constraints but to a lesser extent than the UK case. This finding adds to the hypothesis that a bank-oriented financial

¹³ Have high significant cash-flow sensitivities and strongly rejects the Euler's equation null hypothesis of no financial constraints.

system (continental case) lightens constraints on (usually small) firms, when compared to a market-oriented system. The same rationale is used by Audretsch and Elston (2002), who find that the firms that report higher ICFS are medium sized.¹⁴ They argue that this results from the fact that SMEs in Germany appear to benefit from a financial system that is bank-oriented and an institutional set that prevents smaller firms to face greater liquidity constraints. Recently, in a study comparing 11 OECD Countries covering the years 1993 to 2000, Semenov (2006) also gives supportive evidence of the presence of greater financial constraints in market-oriented economies.

Stylized Result 8- Firms are less financially constrained in economies with more developed financial markets.

It has been argued that financial constraints arise with imperfect financial markets owing to asymmetric information between firms and finance suppliers, leading to adverse selection and moral hazard problems and thus to a wedge between the costs associated with internal funds and those associated with external finance. As a result, one can expect that firms operating in countries with less developed/integrated financial markets will be more exposed to the constraints as there will be a greater amount of frictions in the market. Oliveira and Fortunato (2006) point out that one of the reasons why Portuguese manufacturing firms are financially constrained, particularly small and young ones, might be due to a relative underdevelopment of capital markets in Portugal when compared to the USA or the UK (firms in Portugal rely mostly on banks for external finance). In the same line, Hutchinson and Xavier (2006) compare the role of internal finance in Slovenia (a leading transition country with still less developed financial markets) with the mature market economy of Belgium. They find that Slovenian firms' growth is more sensitive to cash-flow than Belgian, with the sensitivity being greater for the case of

¹⁴ Note that the authors divide firms into 4 classes according to their size (<500 employees; 500-1300 employees; 1300-5500 employees; >5500 employees) and thus the first class might be seen as small and medium enterprises (SMEs). Higher and most significant sensitivities are found for classes 2 and 3.

small firms in either country. Also for Eastern European countries, Budina et al. (2000) for Bulgaria and Konings et al. (2003) for Poland, Czech Republic, Bulgaria and Romania, identify high ICFS, possibly indicating the presence of relevant financial constraints.¹⁵ Desai et al. (2003), comparing the skewness of distributions between Western, Central and Eastern Europe, as well as particularising for the UK case, also support these results. Hartarska and Vega (2006) and Hartarska and Nadolnyak (2008), respectively, for Russia and Bosnia-Herzegovina, find higher ICFS for firms that had no access to microfinance, vital in less financially developed economies.

In addition, for a sample of harmonized firm-level data for 16 industrialized and emerging countries,¹⁶ Aghion et al. (2007) also reinforce the importance of the development of financial markets in allowing the access to external finance for small firms. They also stress the impact that financial constraints do have for entry of small firms, working as an entry barrier. Meanwhile, Islam and Mozumdar (2007), for a sample of 31 countries covering the period 1987-1997, confirm that investment is more sensitive to cash-flow for firms in economies with less developed financial markets. Love (2003) also supports this evidence for a sample of 40 countries.

On another perspective, Haas and Peeters (2006) show that, for ten transition economies,¹⁷ firms increased their leverage during the transition period in order to reach their optimum target leverage level, despite many firms still prefer internal funding due to information asymmetries in the market for cash. These results imply that, before transition, firms were operating below optimal leverage levels and thus suffered from external finance constraints.

¹⁵ Konings et al. (2003) also find that firms in Poland and Czech Republic experience higher ICFS than in Bulgaria and Romania (explained by soft-budget constraints).

¹⁶ Namely Argentina, Denmark, Chile, Colombia, Finland, France, Germany, Hungary, Italy, Mexico, the Netherlands, Portugal, Romania, Slovenia, the UK and the USA.

¹⁷ Namely Estonia, Slovenia, Latvia, Lithuania, Slovak Republic, Bulgaria, Hungary, Czech Republic, Romania and Poland.

With respect to regional financial development, in a comparison between southern and northern regions of Italy, Sarno (2005) finds that SMEs in the less financially developed southern Italian regions are more severely affected by credit constraints. Guiso et al. (2004) also for the Italian case, analysing the impact of local financial development, confirm that the development of local financial markets has a major impact in relieving financial constraints in particular for smaller firms that have no access to broader capital markets.

Stylized Result 9- Financial liberalization seems to alleviate financing constraints of firms, especially for smaller ones.

In the economies where financial markets are overregulated, several inefficiencies arise due to information hampering along with heavy bureaucratic procedures. Usually, financial liberalization facilitates the access of firms to credit, specially small ones, by reducing the institutional barriers and transaction costs in the market for credit. Gelos and Werner (2002), for example, analysing the Mexican manufacturing sector for the period 1984-94, find that investment was generally financially constrained and that liberalization eased the access of small firms to external funds (note that large firms previously had a preferential treatment). Bhaduri (2005) and Ghosh (2006) also show that financial liberalization in India during the 1990s alleviated financial constraints faced by manufacturing firms, in particular for small ones. Several other studies report that financial reform caused a reduction in financial constraints, for instance: Harris et al. (1994) for Indonesia, Guncavdi et al. (1998) for Turkey, Laeven (2002) and Koo and Maeng (2005) for Korea and Wang (2003) for Taiwan. In an opposing direction of liberalization, Forbes (2007) recently showed that Chilean capital controls increased financial constraints for small firms.

There is, however, some mixed empirical evidence on the effect of financial liberalization on firms' investment. Laeven (2003), for a large sample of firms in 13 developing countries, finds that financial liberalization affects firms differently: while it relaxes financial constraints faced by small firms, it results on the opposite for larger ones.

Finally, with respect to securities regulation, MacIntoch (1994) identified legal and institutional barriers to financing innovative companies in the USA and Canada. Chiu (2003) for Canada and Europe and Cohn (1999) for the USA also find supporting evidence of the negative effects of regulation in aggravating firms' financial constraints.

Stylized Result 10- Foreign-owned firms are less financially constrained than domestic ones.

Firms that have access to foreign capital markets are expected to be less financially constrained than those that have to resort solely to national capital markets, thus facing information asymmetries and severe financial constraints. Ownership (national versus foreign) is believed to create a wedge between firms that have access to outside markets (foreign-owned) and those that do not. Blalock et al. (2008), for example, find evidence for Indonesia (following the 1997 East Asian financial crisis) suggesting that firm ownership is an important determinant of investment as foreign ownership is associated with firms not being financially constrained. Colombo and Stanca (2006) also observe this wedge in budget constraints for firms in Hungary over the period 1989-1999. The introduction of financial reforms in the country leads domestic firms to face stronger constraints with respect to foreign-owned firms. Public firms (particularly small ones), however, were unaffected and remained under soft budget constraints. Hutchinson and Xavier (2006) show that foreign owned firms in Slovenia are less constrained and Ruiz-Vargas (2000) corroborate these results for the case of Puerto Rico. Finally, Beck et al. (2006), using a firm-level survey conducted in 1999 and 2000 over 80 countries, find that domestic firms report higher financing obstacles.

4. Measure problems and conceptual issues

We shall briefly address some empirical problems and conceptual issues, mostly related to data and sampling that are often raised when analysing financial constraints faced by firms. Firstly, when analysing small firms or SMEs, because of diverse definitions, it is important to precise what does "small" mean. Just to illustrate, a small firm might mean a firm with less than 5, 20 or 50 employees and a "small firm" in the USA is different from a "small firm" in Europe.

Secondly, one must be aware of the data source and the dismal sample. Most studies focus solely on firms in the manufacturing sector or firms that are publicly traded (both are the easiest samples to obtain). This reduced samples, might generate biases if one expects to draw conclusions for the whole economy. As an example, if one investigates if financial constraints are more severe for smaller firms using traded firms it is reasonable to expect that the observed firms will not be as constrained as if the sample included non-traded firms. This would happen because traded firms have to provide extra information when quoted and then information asymmetries are necessarily lower for these firms.¹⁸

Thirdly, when analysing start-ups, it is difficult to identify potential entrants and obtaining their financial status information. One only observes firms that indeed overcome entry barriers (stressing the financial barrier). As a result, firms that did not overcome the entry barriers are not taken into account.

Fourthly, several problems emerge in survival analysis: (a) length biased sampling – if using stock sampling, one may not observe firm dynamics in between sample periods, thus survival rates tend to be larger; (b) repeated entry – one must consider *de novo entry* as not independent of previous failures (usually this is not taken into account); (c) death definition – firms may exit the sample even if they have not died (using two missing observations in a row to define death, as it is usually done, probably will not expurgate all other exits).

¹⁸ Kim (1999) for Korea finds that when firms decide to go traded they experience lower ICFS and that the financial constraint relaxation is more noticeable for smaller firms.

Fifthly, several problems arise when we use ICFS to test the presence of financial constraints faced by firms. In particular, we must reinforce that using Q theory derived models might entail significant miss measurement errors due to the estimation of Q (see Poterba, 1988, Erickson and Whited, 2000, and Alti, 2003, for a discussion).

Finally, consistent financial constraints classification is a major issue of investigation. Financial constraints are an abstraction, so researchers use proxies such as the followings: (a) dividend payout ratio; (b) firm self evaluation; (c) cash stocks; (d) degree of leverage; (e) age; size; (f) institutional affiliation; (g) credit ratings. Most of them result from previous empirical findings suggesting a strong association between variables despite they can always be questionable.

5. Concluding remarks

Financial constraints are a widespread key concern for firms, hindering their ability to carry out their optimal investment and growth trajectories. In particular, the difficulties in obtaining external funds seem to be highly dependent upon a firm's ownership (national versus foreign), age and size, as well as on a set of institutional characteristics such as the structure and development of the financial system. In addition, financial constraints appear to have a determinant impact upon firm dynamics of entry (through start-ups/entrepreneurial activity) and exit (through firm survival), as well as on R&D investment. In order to alleviate these constraints, public policy, either by subsidies and credit guarantees or by improving financial market efficiency seems to be effective.

However, financial constraint analysis is still subject to much debate as most empirical studies of these effects not only have to deal with a set of measurement and conceptual issues, but also rely upon a fragile relationship built to identify the presence and severity of financial constraints. Future research on the effects of financial constraints should aim at developing and employing more consistent measures, to then analyse the dynamics of firms, possibly within a Schumpeterian framework, as well as a welfare analysis of the impact of public incentives to lighten these constraints.

References

- Abel, A.B. and Eberly, J.C. (2004) Q Theory without adjustment costs and cash flow effects without financing constraints. 2004 Meeting Papers. Society for Economic Dynamics.
- Aghion, P., Fally, T. and Scarpetta, S. (2007) Credit constraints as a barrier to the entry and post-entry growth of firms. *Economic Policy* 0(52): 731-72, 776-79.
- Akerlof, G.A. (1970) The market for 'lemons': quality uncertainty and the market mechanism. *Quarterly Journal of Economics* 84(3): 488-500.
- Albuquerque, R. and Hopenhayn, H.A. (2000) Optimal dynamic lending contracts with imperfect enforceability. RCER Working Papers. University of Rochester, Center for Economic Research.
- Allayannis, G. and Mozumdar, A. (2004) The impact of negative cash flow and influential observations on investment-cash flow sensitivity estimates. *Journal of Banking and Finance* 28(5): 901-30.
- Almeida, H. and Campello, M. (2001) Financial constraints and investment-cash flow sensitivities: New theoretical foundations. Working Papers. New York University.
- Almeida, H., Campello, M. and Weisbach, M.S. (2004) The cash flow sensitivity of cash. *Journal of Finance* 59(4): 1777-804.
- Alti, A. (2003) How sensitive is investment to cash flow when financing is frictionless?. *Journal of Finance* 58(2): 707-22.
- Audretsch, D.B. and Elston, J.A. (2002) Does firm size matter? Evidence on the impact of liquidity constraints on firm investment behavior in Germany. *International Journal of Industrial Organization* 20(1): 1-17.
- Audretsch, D.B. and Mahmood, T. (1995) New-firm survival: New results using a hazard function." *Review of Economics and Statistics* 77(1): 97-103.
- van Auken, H.E. (1999) Obstacles to business launch. *Journal of Developmental Entrepreneurship* 4(2): 175-87.
- Becchetti, L. and Trovato, G. (2002) The determinants of growth for small and medium sized firms: The role of the availability of external finance. *Small Business Economics* 19(4): 291-306.
- Beck, T., Demirguc-Kunt, A., Laeven, L. and Maksimovic, V. (2006) The determinants of financing obstacles. *Journal of International Money and Finance* 25(6): 932-52.
- Bhaduri, S.N. (2005) Investment, financial constraints and financial liberalization: Some stylized facts from a developing economy, India. *Journal of Asian Economics* 16(4): 704-18.

- Bhaduri, S.N. (2008) Investment and capital market imperfections: Some evidence from a developing economy, India. *Review of Pacific Basin Financial Markets and Policies* 11 (3): 411-28.
- Bhagat, S., Moyen, N. and Suh, I. (2005) Investment and internal funds of distressed firms. *Journal of Corporate Finance* 11(3): 449-72.
- Blalock, G., Gertler, P.J. and Levine, D.I. (2008) Financial constraints on investment in an emerging market crisis. *Journal of Monetary Economics* 55(3): 568-91.
- Blumberg, B.F. and Letterie, W.A. (2008) Business starters and credit rationing. *Small Business Economics* 30(2): 187-200.
- Bo, H., Lensink, R. and Sterken, E. (2003) Uncertainty and financial constraints. *European Finance Review* 7(2): 297-321.
- Bohacek, R. (2006) Financial constraints and entrepreneurial investment. *Journal of Monetary Economics* 53(8): 2195-212.
- Bond, S., Elston, J.A., Mairesse, J. and Mulkay, B. (2003) Financial factors and investment in Belgium, France, Germany, and the United Kingdom: A comparison using company panel data. *Review of Economics and Statistics* 85(1): 153-65.
- Bond, S., Harhoff, D. and van Reenen, J. (1999) Investment, R&D and financial constraints in Britain and Germany. IFS Working Papers W99/01. Institute for Fiscal Studies.
- Bottazzi, G., Grazzi, M., Secchi, A. and Tamagni, F. (2007) Assessing the impact of credit ratings and economic performance on firm default. LEM Papers Series 2007/15. Laboratory of Economics and Management, Sant'Anna School of Advanced Studies.
- Bougheas, S., Görg, H. and Strobl, E. (2003) Is R&D financially constrained? Theory and evidence from Irish manufacturing. *Review of Industrial Organization* 22(2): 159-74.
- Budina, N., Garretsen, H. and de Jong, E. (2000) Liquidity constraints and investment in transition economies – the case of Bulgaria. *Economics of Transition* 8(2): 453-75.
- Cabral, L. and Mata, J. (2003) On evolution of the firm size distribution: Facts and theory. *American Economic Review* 93(4): 1075-90.
- Carpenter, R.E., Fazzari, S.M. and Petersen, B.C. (1998) Financing constraints and inventory investment: A comparative study with high-frequency panel data. *Review of Economics and Statistics* 80(4): 513-19.
- Carpenter, R.E. and Petersen, B.C. (2002) Is the growth of small firms constrained by internal finance?. *Review of Economics and Statistics* 84(2): 298-309.
- Chang, X., Tan, T.J., Wong, G. and Zhang, H. (2007) Effects of financial constraints on corporate policies in Australia. *Accounting and Finance* 47(1): 85-108.

- Chapman, D.R., Junor, C.W. and Stegman, T.R. (1996) Cash flow constraints and firms' investment behaviour. *Applied Economics* 28(8): 1037-47.
- Chiao, C. (2002) Relationship between debt, R&D and physical investment, evidence from US firm-level data. *Applied Financial Economics* 12(2): 105-21.
- Chirinko, R.S. (1997) Finance constraints, liquidity, and investment spending: Theoretical restrictions and international evidence. *Journal of the Japanese and International Economies* 11(2): 185-207.
- Chiu, H.Y. (2003) Can UK small businesses obtain growth capital in the public equity markets? An overview of the shortcomings in UK and European securities regulation and considerations for reform. *Delaware Journal of Corporate Law* 28(3): 933-77.
- Cleary, S. (1999) The relationship between firm investment and financial status. *Journal of Finance* 54(2): 673-92.
- Cleary, S., Povel, P.E. and Raith, M. (2007) The U-shaped investment curve: Theory and evidence. *Journal of Financial and Quantitative Analysis* 42(1): 1-39.
- Cohn, S.R. (1999) Impact of securities laws on developing companies: Would the Wright brothers have gotten off the ground?. *Journal of Small and Emerging Business Law* 3(2), 315-66.
- Colombo, E. and Stanca, L. (2006) Investment decisions and the soft budget constraint: Evidence from a large panel of Hungarian firms. *Economics of Transition* 14(1), 171-98.
- Colombo, M.G. and Grilli, L. (2005) Start-up size: The role of external financing. *Economics Letters* 88(2): 243-50.
- Colombo, M.G. and Grilli, L. (2007) Funding gaps? Access to bank loans by high-tech start-ups. *Small Business Economics* 19(1): 25-46.
- Cooley, T.F. and Quadrini, V. (2001) Financial markets and firm dynamics. *American Economic Review* 91(5): 1286-310.
- Cowling, M. and Mitchell, P. (2003) Is the Small firms loan guarantee scheme hazardous for banks or helpful to small business?. *Small Business Economics* 21(1): 63-71.
- Cressy, R. (1996) Pre-entrepreneurial income, cash-flow growth and survival of startup businesses: Model and tests on U.K. Data. *Small Business Economics* 8(1): 49-58.
- Cummings, J.G.; Hassett, K.A. and Oliner, S.D. (2006) Investment behavior, observable expectations, and internal funds. *American Economic Review* 96(3): 796-810.
- Czarnitzki, D. (2006) Research and development in small and medium-sized enterprises: The role of financial constraints and public funding. *Scottish Journal of Political Economy* 53(3): 335- 57.

- Dasgupta, S. and Sengupta, K. (2007) Corporate liquidity, investment and financial constraints: Implications from a multi-period model. *Journal of Financial Intermediation* 16(2): 151-74.
- Desai, M., Gompers, P. and Lerner, J. (2003) Institutions, capital constraints and entrepreneurial firm dynamics: Evidence from Europe. NBER Working Papers 10165. National Bureau of Economic Research.
- Diamond, D. (1991) Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy* 99(4): 688-721.
- Egeln, J., Licht, G. and Steil, F. (1997) Firm foundations and the role of financial constraints. *Small Business Economics* 9(2): 137-50.
- Eisfeldt, A.L. and Rampini, A.A. (2007) New or used? Investment with credit constraints. *Journal of Monetary Economics* 54(8): 2656-81.
- Erickson, T. and Whited, T.M. (2000) Measurement error and the relationship between investment and Q. *Journal of Political Economy* 108(5): 1027-57.
- Faggiolo, G. and Luzzi, A. (2006) Do liquidity constraints matter in explaining firm size and growth? Some evidence from the Italian manufacturing industry. *Industrial and Corporate Change* 15(1): 1-39.
- Farinha, L. (2005) The survival of new firms: impact of idiosyncratic and environmental factors. *Financial stability report 2005*, Lisboa: Banco de Portugal.
- Fazzari, S.M., Hubbard, R.G. and Petersen, B.C. (1988) Financing constraints and corporate investment. *Brookings Papers on Economic Activity* 0(1): 141-95.
- Fazzari, S.M., Hubbard, R.G. and Petersen, B.C. (2000) Investment-cash flow sensitivities are useful: A comment on Kaplan and Zingales. *Quarterly Journal of Economics* 115(2): 695-705.
- Fohlin, C. (1998) Fiduciary and firm liquidity constraints: The Italian experience with German-style universal banking. *Explorations in Economic History* 35(1): 83-107.
- Forbes, K.J. (2007) One cost of the Chilean capital controls: Increased financial constraints for smaller traded firms. *Journal of International Economics* 71(2): 294-323.
- Fotopoulos, G. and Louri, H. (2000) Determinants of hazard confronting new entry: Does financial structure matter?. *Review of Industrial Organization* 17(3): 285-300.
- van Gelderen, M., Thurik, R. and Bosma, N. (2006) Success and risk factors in the pre-startup phase. *Small Business Economics* 26(4): 319-35.
- Gelos, R.G. and Werner, A.M. (2002) Financial liberalization, credit constraints, and collateral: investment in the Mexican manufacturing sector. *Journal of Development Economics* 67(1), 1-27.

- Ghosh, S. (2006) Did financial liberalization ease financing constraints? Evidence from Indian firm-level data. *Emerging Markets Review* 7(2): 176-90.
- Gomes, J.F. (2001) Financing investment. *American Economic Review* 91(5): 1263-85.
- Grilo, I. and Irigoyen, J.M. (2006) Entrepreneurship in the EU: To wish and not to be. *Small Business Economics* 26(4): 305-18.
- Guariglia, A. (2008) Internal financial constraints, external financial constraints, and investment choice: Evidence from a panel of UK firms. *Journal of Banking and Finance* 32(9), 1795-809.
- Guiso, L., Sapienza, P. and Zingales, L. (2004) Does local financial development matter?. *Quarterly Journal of Economics* 119(3): 929-69.
- Guncavdi, O., Bleaney, M. and McKay, A. (1998) Financial liberalization and private investment: Evidence from Turkey. *Journal of Development Economics* 57 (2): 443-55.
- de Haas, R. and Peeters, M. (2006) The dynamic adjustment towards target capital structures of firms in transition economies. *Economics of Transition* 14(1): 133-69.
- Hall, Bronwyn H. (1992) Investment and research and development at the firm level: Does the source of financing matter?. NBER Working Paper 4096, National Bureau of Economic Research.
- Hall, B.H. (2002) The financing of research and development. NBER Working Papers 8773, National Bureau of Economic Research.
- Hall, B.H., Mairesse, J., Branstetter, L. and Crepon, B. (1999) Does cash flow cause investment and R&D? An exploration using panel data for French, Japanese, and United States Scientific firms. In D.B. Audretsch and A.R. Thurik (eds.) *Innovation, Industry Evolution, and Employment* (pp. 129-56). Cambridge: Cambridge University Press.
- Hao, K.Y. and Jaffe, A.B. (1993) Effect of liquidity on firms' R&D spending. *Economics of Innovation and New Technology* 2(4): 275-82.
- Harris, J., Schiantarelli, F. and Siregar, M. (1994) The effect of financial liberalization on firms' capital structure and investment decisions: Evidence from a panel of Indonesian manufacturing establishments, 1981–1988. *World Bank Economic Review* 8(1): 17-47.
- Hartarska, V. and Gonzalez-Vega, C. (2006) What affects new and established firms expansion? Evidence from small Firms in Russia. *Small Business Economics* 27(2-3): 195- 206.
- Hartarska, V. and Nadolnyak, D. (2008) An impact analysis of microfinance in Bosnia and Herzegovina. *World Development* 36(12): 2605-19.
- Heino, H. (2006) Use of borrowed start-up capital and micro enterprises in Mexico: Existence of liquidity constraints. *Portuguese Economic Journal* 5(1): 1-30.

- Himmelberg, C.P. and Petersen, B.C. (1994) R&D and internal finance: A panel study of small firms in high-tech industries. *Review of Economics and Statistics* 76(1): 38- 51.
- Honjo, Y. and Harada, N. (2006) SME policy, financial structure and firm growth: evidence from Japan. *Small Business Economics* 27(4): 289-300.
- Hutchinson, J. and Xavier, A. (2006) Comparing the impact of credit constraints on the growth of SMEs in a transition country with an established market economy. *Small Business Economics* 27(2): 169-79.
- Hyytinen, A. and Väänänen, L. (2006) Where do financial constraints originate from? An empirical analysis of adverse selection and moral hazard in capital markets. *Small Business Economics* 27(4): 323-48.
- Islam, S.S. and Mozumdar, A. (2007) Financial market development and the importance of internal cash: evidence from international data. *Journal of Banking and Finance* 31(3), 641-58.
- Jaffee, D.M. and Russell, T. (1976) Imperfect information, uncertainty, and credit rationing. *Quarterly Journal of Economics* 90(4): 651-66.
- Kadapakkam, P.R, Kumar, P.C. and Riddick, L.A. (1998) The Impact of cash flows and firm size on investment: The international evidence. *Journal of Banking and Finance* 22(3): 293-320.
- Kang, J. and Heshmati, A. (2008) Effect of credit guarantee policy on survival and performance of SMEs in Republic of Korea. *Small Business Economics* 31(4): 445-62.
- Kaplan, S.N. and Zingales, L. (1997) Do investment-cash flow sensitivities provide useful measures of financing constraints. *Quarterly Journal of Economics* 112(1): 169-215.
- Kaplan, S.N. and Zingales, L. (2000) Investment-cash flow sensitivities are not valid measures of financing constraints. *Quarterly Journal of Economics* 115(2): 707-12.
- Kim, J. (1999) The relaxation of financing constraints by the initial public offering of small manufacturing firms. *Small Business Economics* 12(3): 191-202.
- Kim, P., Aldrich, H. and Keister, L. (2006) Access (not) denied: The impact of financial, human, and cultural capital on entrepreneurial entry in the United States. *Small Business Economics* 27(1): 5-22.
- Klassen, K.J., Pittman, J.A., Reed, M.P. and Fortin, S. (2004) A cross-national comparison of R&D expenditure decisions: Tax incentives and financial constraints. *Contemporary Accounting Research* 21(3): 639-84.
- Konings, J., Rizov, M. and Vandenbussche, H. (2003) Investment and financial constraints in transition economies: Micro evidence from Poland, the Czech Republic, Bulgaria and Romania. *Economics Letters* 78(2): 253-58.

- Koo, J. and Maeng, K. (2005) The effect of financial liberalization on firms' investments in Korea. *Journal of Asian Economics* 16(2): 281-97.
- Kukuk, M. and Stadler, M. (2001) Financing constraints and the timing of innovations in the German services sector. *Empirica* 28(3): 277-92.
- Laeven, L. (2002) Financial constraints on investments and credit policy in Korea. *Journal of Asian Economics* 13(2): 251-69.
- Laeven, L. (2003) Does financial liberalization reduce financing constraints?. *Financial Management* 32(1): 5-34.
- Leland, H.E. and Pyle, D.H. (1977) Informational asymmetries, financial structure, and financial intermediation. *Journal of Finance* 32(2): 371-87.
- Li, W. (2002) Entrepreneurship and government subsidies: A general equilibrium analysis. *Journal of Economic Dynamics and Control* 26(11): 1815-44.
- Lotti, F. and Santarelli, E. (2004) Industry dynamics and the distribution of firm sizes: A nonparametric approach. *Southern Economic Journal* 70(3): 443-66.
- Love, I. (2003) Financial development and financing constraints: international evidence from the structural investment model. *Review of Financial Studies* 16(3): 765-91.
- Lyandres, E. (2007) Costly external financing, investment timing, and investment-cash flow sensitivity. *Journal of Corporate Finance* 13(5): 959-80.
- MacIntoch, J.G. (1994) Legal and institutional barriers to financing innovative enterprise in Canada. Discussion Paper 94-10. Kingston: School of Policy Studies, Queen's University.
- Magri, S. (2008) Household wealth and entrepreneurship. Bank of Italy.
- Mata, J. and Portugal, P. (1994) Life duration of new firms. *Journal of Industrial Economics* 42(3): 227-45.
- Mohnen P., Palm, F.C., Loeff, S. and Tiwari, A. (2008) Financial constraints and other obstacles: Are they a threat to innovation activity?. *De Economist* 156(2): 201-214.
- Musso, P. and Schiavo, S. (2008) The impact of financial constraints on firm survival and growth. *Journal of Evolutionary Economics* 18(2): 135-49.
- Myers, S.C. and Majluf, N.S. (1984) Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13(2): 187-221.
- Nykqvist, J. (2008) Entrepreneurship and liquidity constraints: Evidence from Sweden. *Scandinavian Journal of Economics* 110(1): 23-43.
- Ogawa, K., Kitasaka, S., Yamaoka, H., and Iwata, Y. (1996) Borrowing constraints and the role of land asset in Japanese corporate investment decision. *Journal of the Japanese and International Economies* 10(2): 122-49.

- Oliveira, B. and Fortunato, A. (2006) Firm growth and liquidity constraints: A dynamic analysis *Small Business Economics* 27(2): 139-56.
- Petersen, M.A. and Rajan, R.G. (1994) The benefits of lending relationships: Evidence from small business data. *Journal of Finance* 49(1): 3-37.
- Petersen, M.A. and Rajan, R.G. (1995) The effect of credit market competition on lending relationships. *Quarterly Journal of Economics* 110 (2): 407-43.
- Petrunia, R. (2007) Persistence of initial debt in the long-term employment dynamics of new firms. *Canadian Journal of Economics* 40(3): 861-80.
- Poterba, J.M. (1988) Comment on “Financing Constraints and Corporate Investment”. *Brookings Papers on Economic Activity* 0(1): 200-04.
- Povel, P. and Raith, M. (2002) Optimal investment under financial constraints: The roles of internal funds and asymmetric information. AFA 2002 Atlanta Meetings.
- Pratap, S. (2003) Do adjustment costs explain investment-cash flow insensitivity?. *Journal of Economic Dynamics and Control* 27(11-12): 1993-2006.
- Ruiz-Vargas, Y. (2000) Small business financing sources between immigrants and natives in Puerto Rico. *Quarterly Review of Economics and Finance* 40(3): 387-99.
- Sarno, D. (2005) Liquidity constraint on the production of firms in southern Italy. *Small Business Economics* 25(2): 133-46.
- Savignac, F. (2009) Impact of financial constraints on innovation: what can be learned from a direct measure?. *Economics of Innovation and New Technology* 17(6): 553-569.
- Scellato, G. (2007) Patents, firm size and financial constraints: An empirical analysis for a panel of Italian manufacturing firms. *Cambridge Journal of Economics* 31(1): 55-76.
- Semenov, R. (2006) Financial systems, financing constraints and investment: Empirical analysis of OECD countries. *Applied Economics* 38(17): 1963-74.
- Stiglitz, J.E. and Weiss, A. (1981) Credit rationing in markets with imperfect information. *American Economic Review* 71(3): 393-410.
- Wang, H.J. (2003) A stochastic frontier analysis of financing constraints on investment: The case of financial liberalization in Taiwan. *Journal of Business and Economic Statistics* 21(3): 406-19.
- Zecchini, S. and Ventura, M. (2009) The impact of public guarantees on credit to SMEs. *Small Business Economics* 32(2): 191-206.

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